Remarks

These Remarks are in reply to the Office Action mailed July 30, 2004. The fee for the addition of new claims is submitted herewith. A Petition for Extension of Time to Respond is submitted herewith, together with the appropriate fee.

Claims 1, 4-8, 10-16, 20-26, 28-31 were pending in the Application prior to the outstanding Office Action. Claims 17-19 were previously withdrawn. In the Office Action, the Examiner allowed claims 28-30, rejected claims 1, 4-8, 10, 13-16, 20-24, and 31, and objected to claims 11-12 and 25-26, solely as being dependent upon a rejected base claim. The present Response amends claims 1, 4-8, 10, 11, 13-16, 20, 25 and 31, leaving for the Examiner's present consideration claims 1, 4-8, 10-16, 20-26, 28-31. Reconsideration of the rejections is requested.

I. REJECTION UNDER 35 U.S.C. §103(A) OVER *SZELISKI ET AL.* (U.S. PATENT 6,044,181) IN VIEW OF *OKITSU* (U.S. PATENT 6,188,800)

Claims 1, 4-6, 10, 13-16 and 31

The Examiner rejected claims 1, 4-6, 10, 13-16 and 31 under 35 U.S.C. §103(a) over *Szeliski* in view of *Okitsu*. Applicants respectfully traverse this rejection.

The Examiner states that regarding claims 1 and 31, *Szeliski* discloses synchronously capturing a set of images from a camera array (see col. 8, lines 49 to col. 9, line 58)...applying a planar transformation to the selected pixels..." See OA, page 3. The Examiner acknowledges that *Szeliski* does not expressly disclose applying a bilinear transformation to the selected pixels, but states that "Okitsu reveals, in figure 24A-D, that it is well known in the art to apply a bilinear transformation to overlapping portions of images to produce a composite image..." See *Id.* However, *Szeliski* fails to teach or suggest either "***synchronously*** capturing a set of images from the camera array" or "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes *using the set of camera offset values*" (emphasis added) as recited in claims 1 and 31.

Szeliski teaches that "a camera **210**...captures a sequence of images **220**...in the invention, the camera motion...is permitted to be any suitable three-dimensional rotation..." See col. 8, line 49 to col. 9, line 58. *Szeliski* teaches using a single camera and capturing a set of a *sequence* of images, rather than a *plurality* of cameras to capture a set of *synchronous* images. The method taught by *Szeliski* includes applying warping a plurality of time-shifted still images to produce a single still image, and does not solve the

problem addressed by the current invention. Nowhere does *Szeliski* teach or suggest "synchronously capturing a set of images from the camera array"as recited in claims 1 and 31. *Okitsu* fails to remedy this deficiency. *Okitsu* teaches transforming parts of a video image, the parts being animated and combined to produce a composite, animated image. See col. 20, lines 45-59. Nowhere does *Okitsu* teach or suggest "synchronously capturing a set of images from the camera array"as recited in claims 1 and 31.

Further, *Szeliski* teaches transforming a sequence of still images having unknown displacement relative to one another ("unlike many prior art methods, [the invention] is not at all restricted to a simple panning motin, but is permitted to be any suitable three-dimensional rotation." See col. 9, lines 30-33). *Szeliski* teaches uses a single camera to capture multiple images, and combining images by applying complex transformations. The method taught by *Szeliski* permits the single camera to be repositioned in three-dimensional space. Such a method is computationally intensive and unsuitable to closely spaced sets of images captured by multiple cameras (i.e., video). Nowhere does *Szeliski* teach or suggest "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claims 1 and 31. *Okitsu* fails to remedy this deficiency. *Okitsu* describes transforming elements of an image, and does not need to be concerned with camera offsets.

Applicants submit that *Szeliski* in view of *Okitsu* fails to teach or suggest either "synchronously capturing a set of images from the camera array" or "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claims 1 and 31. Because *Szeliski* in view of *Okitsu* fails to teach or suggest all of the features of claims 1 and 31, *Szeliski* in view of *Okitsu* cannot render claims 1 and 31 obvious under 35 U.S.C. §103(a). Dependent claims 4-6, 10, and 13-16 ultimately depend from independent claim 1 and are therefore patentable for at least the reasons given for the patentability of claim 1. Accordingly, Applicants respectfully requests the withdrawal of this rejection.

II. REJECTION UNDER 35 U.S.C. §103(A) OVER *SZELISKI* AND *OKITSU* IN VIEW OF *HARDING* (U.S. PATENT 5,966,177)

Claims 7 and 8

The Examiner rejected claims 7 and 8 under 35 U.S.C. §103(a) over *Szeliski* in view of *Okitsu* in further view of *Harding*. Applicants respectfully traverse this rejection.

For the reasons given above in Section I, *Szeliski* in view of *Okitsu* fails to teach or suggest either "synchronously capturing a set of images from the camera array" or "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claim 1. *Harding* fails to remedy this deficiency. *Harding* teaches an image display apparatus that compensates for non-linearity in a display projector response. See col. 1, line 52 to col. 2, lines 2. Nowhere does *Harding* teach or suggest "synchronously capturing a set of images from the camera array" or "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claim 1.

Applicants submit that *Szeliski* in view of *Okitsu* in further view of *Harding* fails to teach or suggest all of the features of claim 1. Because *Szeliski* in view of *Okitsu* in further view of *Harding* fails to teach or suggest all of the features of claims 1 and 31, *Szeliski* in view of *Okitsu* in further view of *Harding* cannot render claims 1 obvious under 35 U.S.C. §103(a). Dependent claims 7 and 8 ultimately depend from independent claim 1 and are therefore patentable for at least the reasons given for the patentability of claim 1. Accordingly, Applicants respectfully requests the withdrawal of this rejection.

III. REJECTION UNDER 35 U.S.C. §103(A) OVER *HENLEY* (U.S. PATENT 5,657,073) IN VIEW OF *SZELISKI*, IN FURTHER VIEW OF *OKITSU*

Claims 20 and 22

The Examiner rejected claims 20 and 22 under 35 U.S.C. §103(a) over *Henley* in view of *Szeliski* in further view of *Okitsu*. Applicants respectfully traverse this rejection.

The Examiner states that *Henley* discloses "a camera array comprising...a set of cameras mounted in an array (10; see col. 4, lines 22-33)" and that "Szeliski discloses warping patches from different images having a same set of registration points into a same corresponding location of the composite image." See OA, page 5. However, *Henley* in view of *Szeliski* fails to teach or suggest "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes *using the set of camera offset values*" (emphasis added) as recited in claim 1.

Henley teaches an "image transformation engine...so as to remove distortions generated by the image capturing process...utilized to merge the images by removing redundant pixels which are found in the overlapping fields of view." See col. 4, lines 8-15. *Henley* teaches analyzing the pixels in the image transformation engine and removing redundancies through analysis and calculation. Nowhere does *Henley*

teach or suggest accomplishing this using a set of camera offset values. Applying a set of camera offset values can allow a user to predefine overlapping pixels, thereby significantly reducing the computational requirements for performing such a transformation, enabling manipulation of live video. *Szeliski* fails to remedy this deficiency. As described above, *Szeliski* teaches transforming a sequence of still images having unknown displacement relative to one another ("unlike many prior art methods, [the invention] is not at all restricted to a simple panning motin, but is permitted to be any suitable three-dimensional rotation." See col. 9, lines 30-33). *Szeliski* teaches uses a single camera to capture multiple images, and combining images by applying complex transformations. The method taught by *Szeliski* permits the single camera to be repositioned in three-dimensional space. Such a method is computationally intensive and unsuitable to closely spaced sets of images captured by multiple cameras (i.e., video). Nowhere does *Szeliski* teach or suggest "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claims 1 and 31. *Okitsu* fails to remedy this deficiency. *Okitsu* describes transforming elements of an image, and does not need to be concerned with camera offsets.

Applicants submit that *Henley* in view of *Szeliski* in further view of *Okitsu* fails to teach or suggest "providing a set of camera offset values for the camera array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claim 1. Because *Henley* in view of *Szeliski* in further view of *Okitsu* fails to teach or suggest all of the features of claim 1, *Henley* in view of *Szeliski* in further view of *Okitsu* cannot render claim 1 obvious under 35 U.S.C. §103(a). Dependent claims 20 and 22 ultimately depend from independent claim 1 and are therefore patentable for at least the reasons given for the patentability of claim 1. Accordingly, Applicants respectfully requests the withdrawal of this rejection.

IV. REJECTION UNDER 35 U.S.C. §103(A) OVER *HENLEY* AND *SZELISKI* AND *OKITSU*, IN VIEW OF *HARDING*

Claims 21, 23 and 24

The Examiner rejected claims 21, 23 and 24 under 35 U.S.C. §103(a) over *Henley* in view of *Szeliski* and *Okitsu* in further view of *Harding*. Applicants respectfully traverse this rejection.

For the reasons given above in Sections I, II and III, *Henley* in view of *Szeliski* and *Okitsu* in further view of *Harding* fails to teach or suggest "providing a set of camera offset values for the camera

array...wherein applying a bilinear transformation includes using the set of camera offset values" as recited in claim 1.

Applicants submit that *Henley* in view of *Szeliski* and *Okitsu* in further view of *Harding* fails to teach or suggest all of the features of claim 1. Because *Henley* in view of *Szeliski* and *Okitsu* in further view of *Harding* fails to teach or suggest all of the features of claim 1, *Henley* in view of *Szeliski* and *Okitsu* in further view of *Harding* cannot render claim 1 obvious under 35 U.S.C. §103(a). Dependent claims 21, 23 and 24 ultimately depend from independent claim 1 and are therefore patentable for at least the reasons given for the patentability of claim 1. Accordingly, Applicants respectfully requests the withdrawal of this rejection.

V. ALLOWABLE SUBJECT MATTER

Claims 11, 12, 25, 26, and 28-30

Applicants appreciate the indication that claims 28-30 are allowed. Claims 11, 12, 25, and 26 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 11 and 25 have been amended to include the limitations relevant to the features for which claims 11 and 25 were deemed allowable. Further, claims 11 and 25 have been amended to clarify the claimed invention.

Applicants assert that the claims as amended are novel over the prior art, and request that claims 11 and 25 be deemed allowable in the present form. Applicants assert that these amendments are not intended to narrow the scope of the claims and that application of the doctrine of equivalents should not be affected under a theory of prosecution estoppel, as defined under the *Festo* ruling.

Claims 12 and 26 depend from claims 11 and 25. Because claims 12 and 26 depend from claims which are now believed to be allowable, claim 12 and 26 are no longer objectionable for the reasons given by the Examiner. Accordingly, Applicants respectfully request the withdrawal of this objection to claims 11, 12, 25 and 26.

VI. CONCLUSION

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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